

UNITED STATES PATENT OFFICE.

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DRIVING-GEAR FOR MOTOR-CARRIAGES.

SPECIFICATION forming part of Letters Patent No. 646,477, dated April 3, 1900.

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To all whom it may concern:

Be it known that I, ROBERT E. TWYFORD, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Driving-Gears for Motor-Carriages, of which the following is a full, clear, and exact description.

My invention relates to certain improvements in the driving mechanism of motor-carriages by which the management and control of the carriage are facilitated; and it consists of novel means for connecting the power-shaft with both forward and rear axle by which all the wheels may be employed to drive the carriage of an improved steering-gear and an improved brake mechanism.

It consists, further, of the novel features of construction hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional plan view taken through the body of the carriage, showing the driving mechanism. Fig. 2 is a longitudinal sectional elevation of the same. Fig. 3 is a detail elevation of the power steering mechanism. Fig. 4 is a transverse sectional view of the brake, and Fig. 5 is a face view of the driving-gear upon the forward axle.

The objects of my invention are to produce a motor-carriage in which all the wheels may be used for traction purposes, in which a large variation in speed may be quickly obtained by simple mechanism, to provide a simple and effective brake, and to provide a power steering device controlled by a hand-lever and having a safety mechanism attached which will prevent throwing the steering-axle at too great an angle. These results are accomplished by the means hereinafter shown and described.

My mechanism is intended to be used in connection with any form of motor. As herein shown, an electric motor Q is provided, which is connected directly with the longitudinally-extending shaft D and is provided with a fly-wheel Q' to insure a storage of power. The shaft D extends nearly the whole length of the carriage.

Within the body of the carriage is a shaft

B, extending longitudinally thereof and provided at each end with bevel-pinions C, meshing, respectively, with a bevel-gear A, fixed upon the rear axle A² of the carriage, and a bevel-gear R upon the forward axle A³, said axles carrying wheels A'. The gear R is a special gear consisting of a ring having teeth thereon and supported by two concentric rings R' and R², the latter being fixed to the axle A³ centrally of its pivot-point. Each ring is journaled upon the one next within by pivots R³ and R⁴, the set of pivots being at right angles to each other, thus forming a universal joint which will permit the axle to turn without the wheel changing its position or its rotative connection with the axle. The toothed ring R is held in engagement with the pinion C by rollers S, which are carried by the fifth-wheel J and bear against the back of the ring R.

The two shafts B and D are parallel with each other and are connected near their forward ends by a bar I, said shafts turning in suitable bearings in cross-bars in the carriage-body. A series of connecting mechanisms are employed, each consisting of a train of gears so proportioned that the speeds vary in each set. One set consists of the gears *d* and *b*, in which the gear *d* is the driver and is of smaller diameter than the gear *b*. In the next set, consisting of the gears *d'* and *b'*, the gears are more nearly of the same size, which produces an increase in the speed. In the third set, consisting of the gears *d*² and *b*², the gear *d*² is the larger, which produces a suitable increase in the speed. In the fourth set, which consists of the gears *d*³, *d*⁴, and *b*³, the third gear *d*⁴ is an idler. This set of driving mechanism is brought into use when it is desired to reverse the direction of travel of the carriage. Each of these sets of driving mechanisms is provided with a suitable clutch mechanism, by means of which the loose member of any one of the set of driving mechanisms may be brought into use. The clutch mechanism may be of any suitable form. As herein shown, it consists of the outer shells E, E', E², and E³, which are fixed to the corresponding gears, and the inner expanding members F F' F² F³, the expanding members being keyed to revolve with the shaft D. These driving connections are ar-